

Technical Attachment**An IMET's Experience with the Space Shuttle Columbia Recovery**

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Introduction

On February 1, 2003, Space Shuttle Columbia disintegrated as it made its re-entry into the earth's atmosphere over the southwest United States. Obviously, a monumental effort has been underway to determine the reason why this took place. Even as the tragedy was unfolding the National Weather Service was working with NASA to determine the cause. Initially this involved the staff of the NWS Spaceflight Meteorology Group at Johnson Space Center, but within hours many other NWS employees were involved in recovery and analysis of radar and other data. Crucial to finding out what went wrong is reconstructing the shuttle from the debris that fell to the earth. Most of the debris from the spacecraft fell over East Texas and western Louisiana, as depicted by clear air returns from nearby radars along the path of the debris (Fig. 1) and NOAA's wind profiler at Palestine, Texas. The recovery search focused on an area along the centerline of the shuttle's ground track. This portion of the path was approximately 220 miles long and 10 miles wide. Local, state and federal agencies have all participated in the search. NWS employees played a major role in the search as well. In addition to NASA, FEMA, and the NWS, other offices involved included the EPA and the U.S. and Texas Forest Services. That is not a complete list, however, as between 15 and 20 different agencies were involved with the search since it began.

Incident Meteorologists from the NWS, or IMETs, were requested shortly after the organized search began. The IMETs are well trained, equipped and experienced in providing forecasting services in the field and on short notice in support of wildfires. Their support includes specialized daily forecasts, advice and products related to aviation weather, and severe weather alerts, so they were an ideal choice for the situation at hand. The National Weather Service had dispatched an IMET to Lufkin, Texas within 24 hours of being notified that one was needed.

Operations at the Disaster Field Office

A Disaster Field Office (DFO) was established in Lufkin to coordinate the search efforts. Four satellite Incident Management Teams (IMTs) were set up in East Texas, at Palestine, Nacogdoches, Corsicana and Hemphill, to conduct the ground searches along the path of the debris. The IMTs were modeled specifically after the team structure used in wildland fire fighting. An IMT is traditionally dispatched to fight wildland fires whenever the fires get out of control. The IMTs naturally have a very structured order of management that facilitates efficient use of time and personnel resources. Approximately 1,000 searchers were stationed at each of the four satellite base camps. In addition to the four main IMTs, there was also a demobilization and mobilization coordination center set up in Longview, Texas, and a dive operations center was set up along the western banks of the Toledo Bend reservoir near Yellowpine, Texas. The latter was necessitated because debris was known or assumed to have fallen into the area lakes. Working hours for the search parties were generally from 0600-1800 (all times local), weather permitting.

The Texas Forest Service was the coordinating agency for each of the four satellite IMTs. Trained IMETs from the NWS were officially detailed to work with the Texas Forest Service. The IMETs were stationed with the Plans Section of the Texas Forest Service at the DFO in Lufkin, and this is the group through which the forecasts were coordinated. Daily briefings were given to the Plans Section at 0830, and then again at 1800 each day. In addition to these two briefings, daily conference calls were held with the Plans Section of all the IMTs, including the DFO, at 1530. Weather briefings were provided to the Plans Section of the IMTs during these calls.

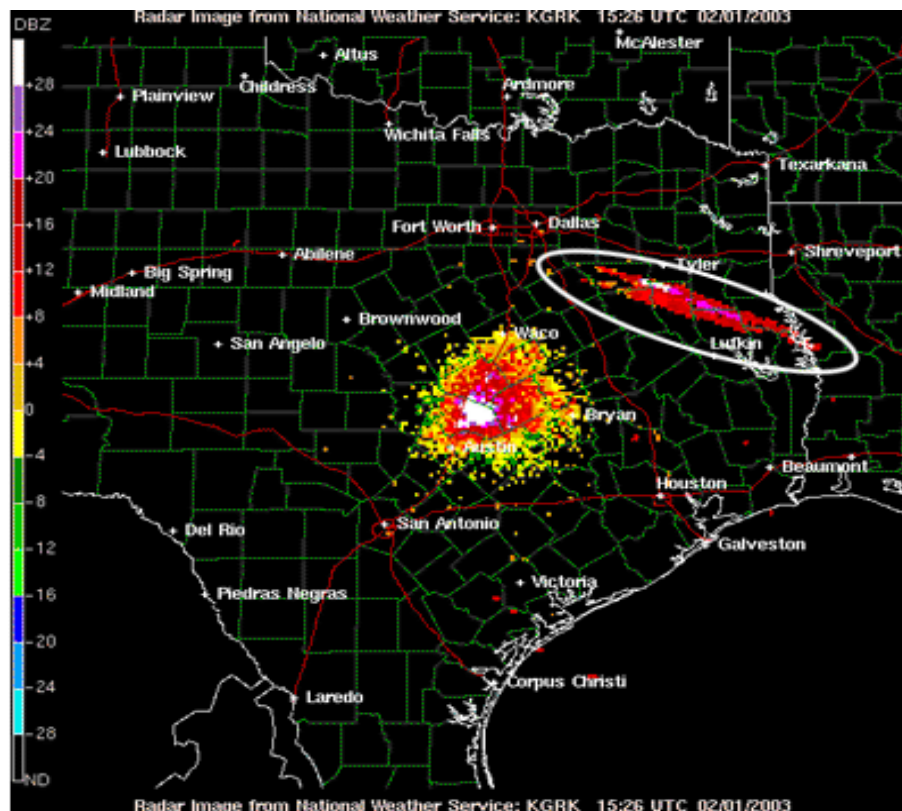


Figure 1. Radar imagery of the Space Shuttle Columbia debris.

As another part of the recovery effort, many small-engine aircraft were on hand to take part in the search, which was the original reason why IMETs were requested. These aircraft flew low-altitude missions over the recovery area to aid in the search efforts of the ground crews. Over 40 aircraft were involved, based at two locations.

About 25 of the planes were based at the Angelina County Airport in Lufkin, and another 15 to 20 were based at the Palestine Municipal Airport. Later in the search, the Palestine aircraft were moved to Ennis, Texas, before they were transferred back to Lufkin as the search efforts wound down in May. The actual number of aircraft involved varied because of the changing number of available pilots. Pilots were brought in to help with the search efforts whenever they were available. The majority of aircraft used were helicopters, but fixed-wing aircraft were also involved. Pilots had to fly close to the ground in order to efficiently search for debris.

Due to the large number of aircraft in the area, a temporary air traffic control tower was set up in Palestine to help direct air traffic. As well as an extra flight control tower, specific aviation forecasts were needed for the flight operations, and these forecasts were provided by the IMETs. These forecasts were prepared by investigating the available meteorological data and also coordinating with the local NWS forecast offices, including Shreveport and Fort Worth. Daily briefings at 0700 were held with the flight crews in Lufkin, and also in Palestine when an IMET was stationed there. The briefings involved providing the aviation forecast for the day, along with alerting pilots about any potential hazards such as low ceilings, high winds or thunderstorms. The forecasts also included outlooks for the pilots for the next few days. As with any incident, the IMET kept a constant weather watch to make updates to the forecast if needed. In the case of significant weather, the IMET had specific personnel to notify in order to get the updated forecast to the pilots in the field. Whenever thunderstorms were expected, the IMETs would closely coordinate with the local forecast offices, and alert the aviation crews and IMTs to the possibility of significant weather.

A major responsibility for the meteorologists was generating forecasts for the four different base camps of the Type I and II Incident Management Teams. Type I and II is a reference to the type of IMT that is being dealt with. IMTs range from Type I to Type IV, with the Type I and II teams typically dealing with the larger wildland fires. Since this recovery area was so large, several teams were required to meet the needs of the search. During the time I spent at the DFO, the number of forecasts, and communication needed was raised significantly. At the onset, one forecast was issued per day for each IMT. After three days, the number of forecasts was raised to twice a day with a fax twice a day as well. These forecasts were disseminated around noon, and then again around 1800. Weather briefings were also provided during the 1030 Incident Commanders (IC) conference calls held daily. The number of forecast issuances later was brought down to one a day with updates as needed. And once again, whenever updates were needed, specific personnel were notified within each of the IMTs.

The dive operations center also needed very frequent updates to the forecast. The equipment used by and to support the divers was very sensitive to weather changes. The sonar equipment needed very specific winds in order to operate effectively. The divers were also sensitive to changes in the weather, because of the water temperature. In order to meet the dive operations needs, telephone briefings were given every two hours on any changes in present weather conditions or the forecast.

Summary

Several National Weather Service IMETs were dispatched to provide support for search operations between February and May, and most served on two separate dispatches. In addition to myself, the individuals involved were:

Bill Adams	WFO Shreveport
Tom Bird	WFO El Paso
Greg Murdoch	WFO Midland
Brent Wachter	WFO Albuquerque
Joe Harris	WFO Fort Worth
Paul Witsaman	SRH Fort Worth
Rick Davis	WFO Tampa Bay Area
Jonathon Pelton	WFO Jackson KY

Personally, the opportunity to serve as an IMET during the Space Shuttle Columbia recovery efforts provided me with a very challenging learning experience. I was able to familiarize myself with much of the terminology used during wildland fire fighting, and I observed firsthand the management structure of an Incident Management Team, the same structure we deal with most often during wildland fires. I also learned how to coordinate quickly and effectively in an environment where many different groups required a variety of information very quickly. In addition, the skills used by the IMET participants during this emergency can be applied directly to the WFO environment, especially during severe weather warning situations when appropriate situational awareness is critical.

Acknowledgment

I would like to thank Steve Cobb, WFO Midland SOO, and the SRH Scientific Services Division for lending advice and expertise to the writing of this article.